

AMENDMENTS TO THE SPECIFICATION:

Page 1, please add the following new paragraphs before paragraph [0001]:

[0000.2] CROSS-REFERENCE TO RELATED APPLICATIONS

[0000.4] This application is a 35 USC 371 application of PCT/DE 2004/001197
filed on June 9, 2004.

[0000.6] BACKGROUND OF THE INVENTION

Please replace paragraph [0001] with the following amended paragraph:

[0001] Prior Art **Field of the Invention**

Please replace paragraph [0002] with the following amended paragraph:

[0002] The invention is ~~based on a~~ **directed to an improved** fuel injection device as
~~generically defined by the preamble to claim 1~~ **for use in an internal combustion engine.**

Please add the following new paragraph after paragraph [0002]:

[0002.5] Description of the Prior Art

Please replace paragraph [0004] with the following amended paragraph:

[0004] ~~Advantages of the Invention~~

SUMMARY AND ADVANTAGES OF THE INVENTION

Please replace paragraph [0005] with the following amended paragraph:

[0005] The fuel injection device for internal combustion engines according to the present
invention~~[[,]] with the characterizing features of claim 1~~, has the advantage over the prior art
of producing a CR injector with a piezoelectric actuator in which it is possible for a larger
valve cross-section to be used. This permits the opening and closing of the injection valve to

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occur more rapidly. The integrated coupler permits a short structural length of the device.
The coupler is assisted by CR pressure.

Page 2, please replace paragraph [0006] with the following amended paragraph:

[0006] ~~Drawing~~ **BRIEF DESCRIPTION OF THE DRAWINGS**

Please replace paragraph [0007] with the following amended paragraph:

[0007] An exemplary embodiment of the fuel injection device according to the present invention is ~~shown in the drawing and will be explained in detail in the subsequent description:~~ **described more fully herein below, in conjunction with the sole drawing figure which shows the essential components of a fuel injection device with an injection valve, a control valve, and a hydraulic coupler.**

Please delete paragraph [0008].

Please replace paragraph [0009] with the following amended paragraph:

[0009] ~~Description of the Exemplary Embodiment~~

DESCRIPTION OF THE PREFERRED EMBODIMENT

Please replace paragraph [0010] with the following amended paragraph:

[0010] The fuel injection device 1 according to the present invention is supplied with highly pressurized fuel from a pressure accumulator (common rail) 3 via a high-pressure line 5 from which fuel travels via an injection line 6 to an injection valve 9. An internal combustion engine normally has a number of such injection valves and for the sake of simplicity, only one of these is shown. The injection valve 9 ~~[[as]]~~ **has** a valve needle (valve piston, nozzle needle) 11, whose conical valve sealing surface 12, in its closed position, closes injection

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openings 13 through which fuel is to be injected into the interior of the combustion chamber of [[the]] an internal combustion engine. The fuel travels into the region of the nozzle needle via an annular nozzle chamber 14 from which it is able to exert a pressure on the nozzle needle in the opening direction by means of a control surface 15 embodied in the form of a pressure shoulder. If the above-mentioned pressure exerts a force on the valve needle in the opening direction that overcomes forces counteracting this opening action, then the valve opens.

Page 3, please replace paragraph [0011] with the following amended paragraph:
[0011] An actuator 31 controls the opening and closing of the injection openings. Depending on how it is triggered, this actuator produces a deflection at a mechanical output and a force for actuating other elements. In the example, it is an electrically triggered actuator. In the example, it is an actuator that has a piezoelectric element, namely a piezoelectric actuator. Depending on an electrical triggering, the actuator assumes an elongated configuration or a shortened configuration in the vertical direction in the drawing and consequently in its longitudinal direction. In the example, an actuator is provided whose design is such that when supplied with current (connection to a direct current supply), it assumes an elongated configuration and [[went]] when without current, it assumes a shortened configuration. The actuator constitutes a capacitive load and does not absorb any power dissipation when continuously supplied with current. It can be advantageous or necessary to preload the piezoelectric actuator by means of a tensioning device, e.g. a spring, so that pressure is continuously exerted on piezoelectric elements contained in the actuator. This is known to

those skilled in the art and therefore will not be discussed below. While the upper end of the piezoelectric actuator is anchored in the injection device in a manner not shown in the drawing, the force and movement of the lower end of the piezoelectric actuator are used to open and close the injection openings. For coupling purposes, a hydraulic coupler 38 is provided that has one piston 39 coupled to the piezoelectric actuator and another piston 40. In the current intended use, it is necessary, generally by means of the coupler, for there to be an increase in the travel distance of the first piston 40 in comparison to the travel distance of the second piston 39 (through appropriate selection of the hydraulically effective piston surface areas). The design and function of the hydraulic coupler will be described further below.

Page 5, please replace paragraph [0014] with the following amended paragraph:

[0014] The moving valve element 51 is essentially conical with a cylindrical extension. In particular, it rests with its conical part against the valve seat 53 when closed. A compression spring 54 guided by the cylindrical extension preloads the valve element 51 toward its valve seat 53. In its closed position, it has been moved “outward”, namely in the direction away from the high pressure in the control chamber 43 toward a region of lower pressure (leakage pressure). The exhaust valve in this case is thus embodied as a valve that opens outward. The side of the valve element 51 oriented toward the valve seat 53 is rigidly connected to an actuating part that is connected to the hydraulic coupler. The connection with the piston [[37]] 40 is advantageously tension-resistant for a particularly rapid closing.

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Page 8, please add the following new paragraph after paragraph [0023]:

[0024] The foregoing relates to a preferred exemplary embodiment of the invention, it being understood that other variants and embodiments thereof are possible within the spirit and scope of the invention, the latter being defined by the appended claims.